

# The Water Cycle

## 'Round and 'Round it Goes!

**Goals:** To help students understand Earth's water cycle, the interrelatedness of water in all its forms, and how human activities can affect water as it passes through the cycle.

**Subjects:** Science

**DPI Objectives:** SC:B3-B5

**EH:** A3, B4, C1

**SS:** B2

**Grades:** 6-9

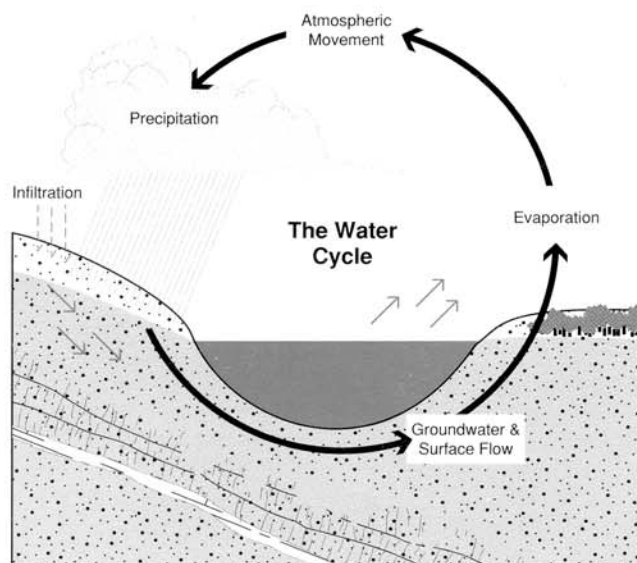
**Materials:**

- ❖ Groundwater and Land Use in the Water Cycle poster
- ❖ 'Round and 'Round it Goes! activity sheet
- ❖ Dictionary

**Background:** Water is our most recycled resource. Consider, for example, that the water you bathed in this morning may have contained the same molecules of water that washed over a South Pacific coral reef a million years ago! The amount of water on Earth is basically constant, but the distribution of water changes over time and space due to a dynamic process called the *hydrologic or water cycle*. The water cycle is powered by solar energy and gravity.

Warmth from the sun causes *evaporation* of water from lakes, streams and soils. Solar energy also drives a process called *transpiration*—the release and evaporation of water from tiny pores in the leaves of plants. Evaporated and transpired water vapor is stored in the atmosphere until it condenses and is pulled by gravity back to earth as rain, sleet, snow, hail, dew or frost.

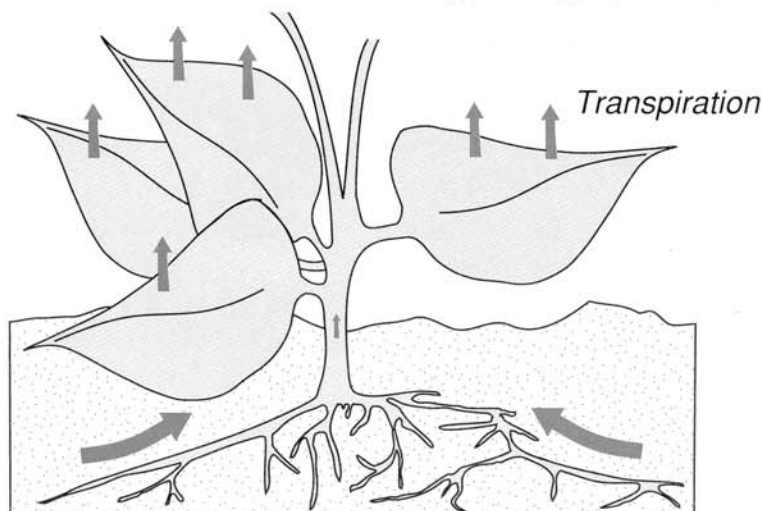
Up to 80% of this precipitated water is returned directly to the atmosphere by evaporation. The rest may run off over land and into lakes and streams or may soak into the ground. Some of the water that soaks into the ground stays in the unsaturated zone. This zone is the rock or soil layer in which some of the spaces between particles are filled with air and some are filled with water. Some of the water in the unsaturated zone is taken up by plant roots and returned to the atmosphere by transpiration.

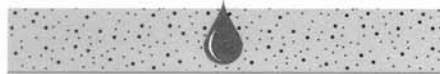


The rest of the water is pulled deeper into the ground by gravity, filling all the cracks and spaces in the underlying layers of soil, gravel and rock. Water in the saturated zone is called *groundwater*. The top of the saturated zone is the *water table*. Water continues to move underground from areas of high elevation toward lowland areas. This movement is generally slow, from a few feet per day to a few feet per year. Wherever the water table meets the land surface a spring may form or groundwater may seep into to a lake, stream, wetland or ocean. Once above ground, the water can evaporate and return to the atmosphere, and the water cycle begins again.

Human activities may affect the quality of water at any point in the cycle. Air pollution can change the chemical composition of rain and snow. Runoff from rainfall and snow melt can pick up soil, excess plant nutrients, pesticides, animal wastes, and municipal and industrial pollutants as it flows over land and into lakes and streams.

Contaminated runoff can also soak into the ground and pollute groundwater. Water percolating through soil and rock may pick up natural minerals or other contaminants. Knowledge of the water cycle can help us understand how water becomes polluted and how pollution can be prevented. (see *Groundwater Supplement* pg. 7)





## Procedure:

1. Distribute copies of the poster. Discuss the background information.
2. Working in small groups, complete the activity sheet. Use the "Water Cycle" poster as a reference.

## Going Beyond:

1. Research how long it might take a drop of water to pass through the entire water cycle.
2. Design and construct a graphic or mural of the water cycle for your community. Include the community's water system and local human impacts on the water cycle.
3. Create a mini-water cycle for your classroom. In an aquarium (terrarium) or wide-mouth glass jar, put a one inch layer of gravel for drainage. Next, add a layer of peat moss and then a layer of

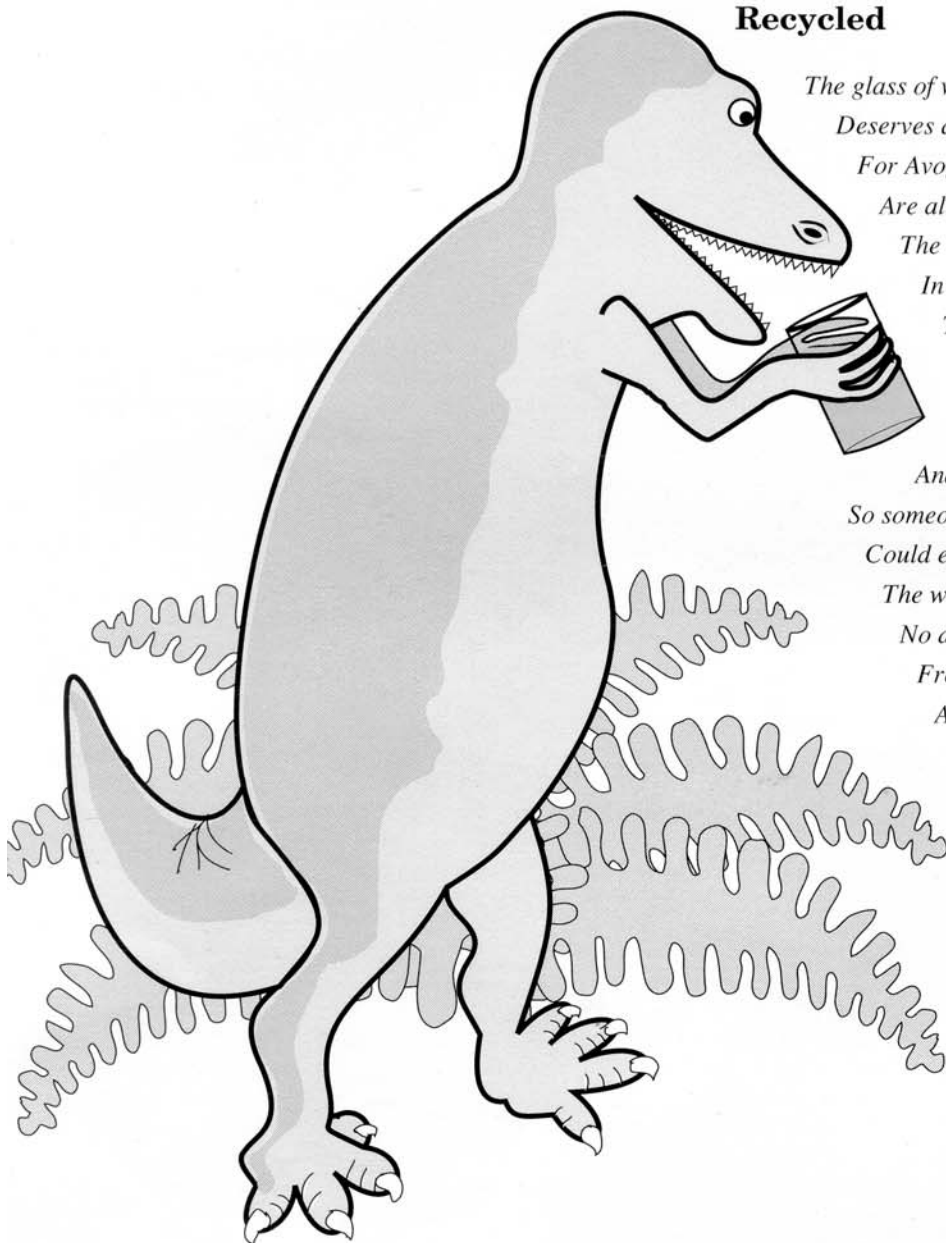
soil. Small houseplants such as violets and ferns can be planted in the terrarium. Water your terrarium lightly and cover it with a piece of glass, leaving approximately 1/2" uncovered for air movement. Keep the terrarium in your classroom and watch what happens over the next week. The plants will take moisture from the soil and release (transpire) it from their leaves. Water molecules will condense on the glass and "rain" back onto the soil.

*Adapted from: **Groundwater Study Guide**. 1984. Wisconsin Department of Natural Resources, Bureau of Information and Education.*

## Recycled

The glass of water you're about to drink  
Deserves a second thought, I think  
For Avogadro, oceans and those you follow  
Are all involved in every swallow.  
The molecules of water in a single glass  
In number, at least five times, outclass  
The glasses of water in stream and sea,  
Or wherever else that water can be.  
The water in you is between and  
betwixt,  
And having traversed is thoroughly mixed,  
So someone quenching a future thirst  
Could easily drink what you drank first!  
The water you are about to taste  
No doubt represents a bit of waste  
From prehistoric beast and bird—  
A notion you may find absurd.  
The fountain spraying in the park  
Could well spout bits of Joan of Arc,  
or Adam, Eve, and all their kin;  
You'd be surprised where your drink  
has been!  
Just think! The water you cannot  
retain  
Will some day hence return as rain,  
Or be held as the purest dew.  
Though long ago it passed through  
you!

Verne N. Rockcastle



# 'Round and 'Round it Goes activity sheet

## Part A

Look carefully at the "Water Cycle" poster. Using information from the poster (and what you already know about water), complete the following questions:

1. Where do you see water on the poster?

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2. Where else is water found on Earth?

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3. The process by which water moves from the surface of plants to the atmosphere is called \_\_\_\_\_.

The process by which water moves from the surface of soil, water, buildings, and parking lots, to the atmosphere is called \_\_\_\_\_.

4. Water forms clouds in the atmosphere and falls to earth as \_\_\_\_\_ ,  
\_\_\_\_\_, \_\_\_\_\_ , or sleet.

5. Where does water go after it falls as precipitation?

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6. What effect does the sun have on the water cycle? What effect does gravity have?

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7. How is groundwater used by people? How do we get water out of the ground?

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8. How many wells are shown on the poster? How is water from these wells used?

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9. List the human activities (shown on the poster) that could affect groundwater quality. Can you think of others?

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10. If a truck carrying chemicals overturned and a chemical pollutant was spilled near the abandoned mine shaft at the far right side of the poster, where might it end up? (There are lots of possibilities!)

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## Part B

Using the poster, what you already know about water, and a dictionary, define the following terms.

hydrologic or water cycle

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water table

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aquifer

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precipitation

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runoff

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condensation

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evaporation

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groundwater

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infiltration

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transpiration

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Wisconsin's Water Cycle	
Average precipitation:	32.0 inches/year
Average runoff:	3.0 inches/year
Evaporation and transpiration:	22.0 inches/year
Becomes groundwater	7.0 inches/year
(Values vary with location.)	

**Part C**

1. What fraction of the annual average precipitation returns to the atmosphere as a result of evaporation and transpiration? \_\_\_\_\_
2. Is any water lost from the cycle? \_\_\_\_\_
3. Does all the water that soaks into the ground remain underground?\_\_\_\_\_ If not, where does it go?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. About what percentage of the total annual precipitation becomes groundwater? \_\_\_\_\_